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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/773,704	01/31/2001	Daniel O. Jones	PLUG-0056-US (734)	7911

7590 11/14/2003

Fred G. Pruner, Jr.
TROP, PRUNER & HU, P.C.
Ste, 100
8554 Katy Freeway
Houston, TX 77024

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 11/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/773,704

Applicant(s)

JONES ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 19-27 is/are pending in the application.
- 4a) Of the above claim(s) 20-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

This communication is responsive to the amendment filed 10/26/03. The rejection is herein maintained for the reasons of record. Thus, the present application is finally rejected.

Election/Restrictions

1. Newly submitted claims 20-27 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: it is noted that claims 20-27 are directed to methods of operating fuel cell stacks comprising: a) "determining an energy storage capacity of a battery to selectively raising a terminal voltage of the battery", and b) "determining an energy state of a second load to selectively taking an action". Accordingly, the inventions represented in claims 20-27 are directed to separate and distinct species for operating fuel cell stacks, and hence, these inventions contain mutually exclusive characteristics or functions as shown above.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 20-27 withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-4 and 6 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bonnefoy 5714874.

Regarding claims 1-4:

Bonnefoy discloses a fuel cell voltage generator wherein the voltage generator is to be connected to a current load; a fuel cell for generating electrical energy to be used by the current load; a storage battery having and control means for modifying a maximum intensity value of the current flowing through the dc converter in accordance with a voltage measured at the terminals of the fuel cell to keep said voltage within a predetermined range, at which a power output of the

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fuel cell is maximum (claims 1, 2, 5-6). It is further disclosed that if the load requires an electric power lower than the one available at the fuel cell, the battery takes profit from the excess of the electric energy (col 2, lines 58-60). It is also disclosed that this invention aims at supplying a voltage generator in which the fuel cell is kept continuously in optimal working conditions, regardless of the load demand, the fuel cell supplies continuously a maximum electric power (col 1, lines 35-40). *Since Bonnefoy teaches the working principle of the fuel cell generator, his teachings thus encompasses the operating method.*

It is further disclosed that the control block is divided in two parts, a first part, grouping all the means necessary for the working control of the fuel cell such as hydrogen supply (mass of fuel), its temperature control and etc, and comprising the control means of the converter (col 2, lines 40-45). It is further taught that as the fuel cell begins to generate enough electric power, it replaces progressively the battery so as to become the only energy source of the generator, it then also supplies the control block (col 2, lines 54-57).

As to the method limitation of "determining whether to route at least some of the power produced by the fuel cell stack and not consumed by the first load" and "selectively routing said at least some of the power produced by the fuel cell stack and not consumed by the first load to the second load", since the prior art (Bonnefoy'874) teaches that "if the load 4 requires an electric power lower than the one available at the fuel cell terminals, the battery takes profit from the excess of electric energy and recharges" (Bonnefoy'874 at col 2, lines 58-60):

If the load 4 requires an electric power lower than the one available at the fuel cell 1 terminals, the battery takes profit from the excess of electric energy and recharges.

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it is therefore asserted that having shown that Bonnefoy '874 teaches routing automatically electric power to a battery (the second load), the above-mentioned characteristic, property and/or function [i.e. 1) "determining whether to route at least some of the power produced by the fuel cell stack and not consumed by the first load" and "selectively routing said at least some of the power produced by the fuel cell stack and not consumed by the first load to the second load" as well as 2) "determining whether the second load-battery is capable of receiving said power produced but not consumed"] is thus inherent as the step or methodology recited in the reference is substantially identical to that of the claims, and therefore, claimed properties, characteristics or functions are presumed to be inherent (MPEP 2112. Requirements of Rejection Based on Inherency). Thus, the prior art's method of operating the fuel cell seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in method of operating the fuel cell described in the reference, and that it would be so recognized by persons of ordinary skill.

In this regard, the examiner further likes to explain that while the term "automatically" might imply that it is acting or done spontaneously, such term "automatically", for instance, also implies having a self-acting or self-regulated mechanism. That is to say, a state or condition in which activity or behavior (of system) is regulated automatically in a predetermined manner. Accordingly, it is understood that while the method of the prior art can be performing steps automatically, there must exist a discriminating sequence (order), or operational subroutine or programmable succession in which such steps are strictly required to be performed based on pre-set operating conditions which are necessitated as to obtaining a continuing, adequate and

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satisfactory fuel cell functionality without affecting the overall system performance, and inherently, its method of operation. Hence, the automatic step of the prior art inherently includes determining or discriminating steps and/or conditions. Thus, the burden is shifted to applicants to provide objective evidence demonstrating the claimed method is necessarily different from the prior art's method, and that the difference is unobvious.

Additionally and for the reasons of record: *it is also noted that applicants has admitted that "Bonneyoy teaches automatically routing electric power to a battery in the event of a deficiency between the power that is consumed by the load 4 and the power that is available at fuel cell terminals" (refer to paper # 5 at page 4, and the appeal brief at pages 14-15) as well as "Bonneyoy teaches routing all excess energy to a battery" (refer to paper # 9 at page 6).*

As to claim 6:

It is disclosed that the control means includes means for measuring the voltage at the terminals of the fuel cell, and wherein the control means respectively increments and decrements the maximum intensity value of the current following through the dc converter when the voltage measured of the fuel cell is above and below said predetermined range; wherein said predetermined range corresponds to a voltage range at which a power output of the fuel cell is maximum (claims 3-4). It is also made known that, in practice, the reference value of the voltage at the fuel cell is determined as being the point of the voltage/current characteristic of the fuel cell corresponding to a maximum power output in normal working conditions of the fuel cell (col 1, lines 59-63).

Therefore, the claims are anticipated by Bonneyoy '874. However, if the claims are not anticipated the claims are obvious as it has been held similar processes claimed in terms of its

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function, property and/or characteristic are obvious. In re Best 195 USPQ 430 and In re Fitzgerald 205 USPQ 594. See rationale and/or technical reason above to reasonably support the determination that the inherent function and/or characteristic necessarily flows from the teaching of the applied prior art.

5. Claims 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bonnefoy 5714874 as applied above to claims 4 and 6, and further in view of the European publication EP 782209.

Bonnefoy is applied, argued and incorporated herein for the reasons above. However, Bonnefoy does not expressly disclose regulating a terminal voltage of the battery and having the specific fuel flow decreased.

As for claims 5 and 7:

The EP'209 publication teaches a supply system with fuel cells and a buffer in which the fuel cell has an output voltage lower than the voltage of the buffer battery (claim 2). It is also disclosed that this enable the power delivered by the fuel cells to the load to be controlled simply, precisely and effectively without need to control the voltage output in any way in order to adjust it to the voltage actually present at the terminals of the battery and to the load requirement (page 4, lines 18-23). It is further taught that since the voltage pulses applied to the primary cannot exceed the minimum voltage output by the fuel cell and the maximum battery voltage is greater, it is necessary that the ratio between the maximum battery voltage and the minimum voltage delivered by the fuel cell is preferably of the order to twice the ratio between

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the mean value of the battery voltage and the mean value of the voltage delivered by the fuel cells. (page 4, lines 24-29).

It is also disclosed that for power values greater than a specific maximum power that can be delivered by the fuel cell power, the power delivered by the fuel cell is kept constant and equal to the specific maximum power so as to make a maximum contribution to the load requirement. For load power less than the specific maximum, the power delivered by the fuel cell is made to depend upon the charge state of the battery; in particular, if the battery voltage indicates a fully charged condition, the power delivered by the cell is equal to the load power; if the battery voltage is lower than thus indicates a partial charge condition, the regulation band is proportional and is displaced in accordance with the lower voltage so as to deliver a recharging power to the battery (page 6, lines 19-35). The portions of the regulation characteristics which are disposed indicate that the power for recharging the battery is the accumulation of a negative load power (recovered from the load) and a power delivered by the fuel cell, which vary inversely maintaining a predetermined and constant recharging power which depends upon the battery voltage and hence upon its charge condition (page 6, lines 30-35).

In view of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to both regulate a terminal voltage of the battery and have the specific fuel flow decreased of the EP'209 publication in the method of operating the fuel cell of Bonnefoy because the EP'209 publication discloses that this enable the power delivered by the fuel cells to the load to be controlled simply, precisely and effectively without need to control the voltage output in any way in order to adjust it to the voltage actually present at the terminals of the battery and to the load requirement. Accordingly, it solves a technical problem and provides

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a supply system with fuel cells and a buffer battery in which a highly efficient, very safe and extremely simply electronic regulation system forms the interface and ensures optimal performance of the drive system, particularly, it limits the current of the fuel cells to a maximum permitted design value; it regulates the power delivered by the fuel cells in dependence on the charge state of the batteries and on the power required by the load; it limits the rate of increase of the power delivered by the cells to permissible values; and it adjusts the voltage output by the fuel cells to a higher battery voltage.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bonnefoy 5714874 in view of the European publication EP 782209 as applied to claim 1 above, and further in view of Hauer 6214484.

Bonnefoy and the EP'209 publication are applied, argued and incorporated herein for the reasons above. In addition, the foregoing prior art fails to disclose the fuel processor to provide the fuel flow.

Hauer teaches a fuel cell arrangement having a fuel cell stack, a methanol reformer (fuel processor) wherein the fuel cell stack is connected with an electrical energy storage device (abstract).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use a fuel processor (reformer) to provide fuel to the fuel cell method of Bonnefoy and the EP'209 publication as Hauer teaches that the fuel processor converts raw fuel into reformed hydrogen which is the specific fuel employed to generate electrical energy from a fuel cell system. As it is conventionally known in the art, very efficient fuel cells use pure

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hydrogen for fuel; and pure hydrogen, has traditionally been difficult to handle and relatively expensive to store and distribute. Consequently, fuel processors process and provide the required hydrogen rich gas mixtures from reforming of various hydrocarbons fuels which are expected to be utilized in fuel cell systems.

7. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bonnefoy 5714874 in view of the European publication EP 782209 as applied to claim 1 above, and further in view of Singh et al US2002/0076588.

Bonnefoy and the EP'209 publication are applied, argued and incorporated herein for the reasons above. In addition, the foregoing prior art fails to disclose routing some power to an oxidizer.

Singh et al disclose a fuel cell system providing means for oxidizing heated reformed fuel gas in fuel cell during transient load conditions (section 0009). It is disclosed that the electrical storage device is capable of electrochemically oxidizing a quantity of reformer gas contained within an anode chamber of the fuel cell during transient load conditions by charging from a preset state of charge towards full capacity (abstract).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to route power to an oxidizer in fuel cell system of Bonnefoy and the EP'209 publication as taught by Singh et al as it is apparent that the routed power is to operate the means for oxidizing during transient load conditions that prevent transient increases in the combustion anode gas during changes in electrical load demand. Accordingly, the energy storage device thereby prevents large quantities of unoxidized reformer gas from entering a chamber of a

combustor during transient load conditions, unoxidized reformer gas that generates tremendous amount of heat when burned that can corrode or damage the combustor. Thus, the energy storage device discharges the excess charge when the fuel cell power generation system returns to normal load conditions or during transient load conditions when the amount of reformer gas entering the anode chamber has been reduced so that the amount of unoxidized reformer gas entering the combustor is maintained at nearly constant level.

Response to Arguments

Applicant's arguments filed 10/26/03 have been fully considered but they are not persuasive. The main contention of applicants' arguments is premised on the assertion that the prior art of record fails "to teach the specific limitation such as "the determining and selective routing of claim 1". In this regard, the examiner contends that since the prior art (Bonnefoy'874) teaches that "if the load 4 requires an electric power lower than the one available at the fuel cell terminals, the battery takes profit from the excess of electric energy and recharges" it is therefore asserted that having shown that Bonnefoy'874 teaches routing automatically electric power to a battery (the second load), the above-mentioned characteristic, property and/or function [i.e. 1)"determining whether to route at least some of the power produced by the fuel cell stack and not consumed by the first load" and "selectively routing said at least some of the power produced by the fuel cell stack and not consumed by the first load to the second load" as well as 2)"determining whether the second load-battery is capable of receiving said power produced but not consumed"] is thus inherent as the step or methodology recited in the reference is substantially identical to that of the claims, and therefore, claimed properties, characteristics or

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functions are presumed to be inherent (**MPEP 2112. Requirements of Rejection Based on Inherency**). Thus, the prior art's method of operating the fuel cell seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in method of operating the fuel cell described in the reference, and that it would be so recognized by persons of ordinary skill. *Thus, such determining and selective routing necessarily flow from the teachings of the prior art, i.e. Bonnefoy'874.*

Moreover, the examiner further likes to explain that while the term "automatically" might imply that it is acting or done spontaneously, such term "automatically", for instance, also implies having a self-acting or self-regulated mechanism. That is to say, a state or condition in which activity or behavior (of system) is regulated automatically in a predetermined manner. Accordingly, it is understood that while the method of the prior art can be performing steps automatically, there must exist a discriminating sequence (order), or operational subroutine or programmable succession in which such steps are strictly required to be performed based on pre-set operating conditions which are necessitated as to obtaining a continuing, adequate and satisfactory fuel cell functionality without affecting the overall system performance, and inherently, its method of operation. Hence, the automatic step of the prior art inherently includes determining or discriminating steps and/or conditions. Thus, the burden is shifted to applicants to provide objective evidence demonstrating the claimed method is necessarily different from the prior art's method, and that the difference is unobvious.

Additionally and for the reasons of record: it is also noted that applicants has admitted that "Bonnefoy teaches automatically routing electric power to a battery in the event of a

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deficiency between the power that is consumed by the load 4 and the power that is available at fuel cell terminals” (refer to paper # 5 at page 4, and the appeal brief at pages 14-15) as well as “Bonnefoy teaches routing all excess energy to a battery” (refer to paper # 9 at page 6). It is also noted that applicants continue to admit that “the circuitry of Bonnefoy may have been designed at some point in response to some determination of how the circuit should behave when power to the load decreases” (emphasis added) (refer to paper # 14, page 1, lines 1-6). Thus, such determining and selective routing necessarily flow from the teachings of the prior art, i.e. Bonnefoy’874.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's primary examiner, Pat Ryan can be reached on (703) 308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro
Examiner
Art Unit 1745

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